

# HFA25TB60

Ultrafast, Soft Recovery Diode

## Features

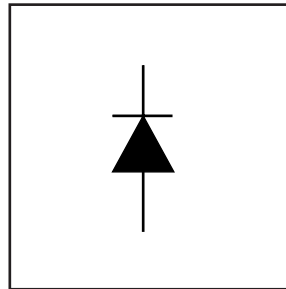
- Ultrafast Recovery
- Ultrasoft Recovery
- Very Low  $I_{RRM}$
- Very Low  $Q_{rr}$
- Guaranteed Avalanche
- Specified at Operating Conditions

## Benefits

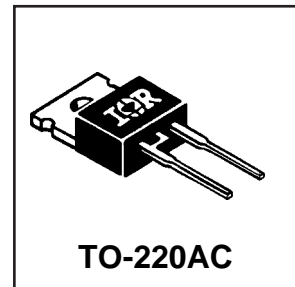
- Reduced RFI and EMI
- Reduced Power Loss in Diode and Switching Transistor
- Higher Frequency Operation
- Reduced Snubbing
- Reduced Parts Count

## Description

International Rectifier's HFA25TB60 is a state of the art ultra fast recovery diode. Employing the latest in epitaxial construction and advanced processing techniques it features a superb combination of characteristics which result in performance which is unsurpassed by any rectifier previously available. With basic ratings of 600 volts and 25 amps continuous current, the HFA25TB60 is especially well suited for use as the companion diode for IGBTs and MOSFETs. In addition to ultra fast recovery time, the HEXFRED product line features extremely low values of peak recovery current ( $I_{RRM}$ ) and does not exhibit any tendency to "snap-off" during the  $t_b$  portion of recovery. The HEXFRED features combine to offer designers a rectifier with lower noise and significantly lower switching losses in both the diode and the switching transistor. These HEXFRED advantages can help to significantly reduce snubbing, component count and heatsink sizes. The HEXFRED HFA25TB60 is ideally suited for applications in power supplies and power conversion systems (such as inverters), motor drives, and many other similar applications where high speed, high efficiency is needed.



$V_R = 600V$
$V_F(\text{typ.})^* = 1.3V$
$I_{F(AV)} = 25A$
$Q_{rr}(\text{typ.}) = 112nC$
$I_{RRM} = 10A$
$t_{rr}(\text{typ.}) = 23ns$
$di_{(rec)M}/dt(\text{typ.}) = 250A/\mu s$



## Absolute Maximum Ratings

	Parameter	Max.	Units
$V_R$	Cathode-to-Anode Voltage	600	V
$I_F @ T_C = 25^\circ C$	Continuous Forward Current	25	A
$I_F @ T_C = 100^\circ C$	Continuous Forward Current		
$I_{FSM}$	Single Pulse Forward Current		
$I_{FRM}$	Maximum Repetitive Forward Current		
$I_{AR} \textcircled{1}$	Maximum Repetitive Avalanche Current		
$P_D @ T_C = 25^\circ C$	Maximum Power Dissipation	125	W
$P_D @ T_C = 100^\circ C$	Maximum Power Dissipation	50	
$T_J$	Operating Junction and	-55 to +150	C
$T_{STG}$	Storage Temperature Range		

\* 125°C

# HFA25TB60

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## Electrical Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$V_{BR}$	Cathode Anode Breakdown Voltage	600	—	—	V	$I_R = 100\mu\text{A}$
$V_{FM}$	Max Forward Voltage	—	1.3	1.7	V	$I_F = 25\text{A}$
		—	1.5	2.0		$I_F = 50\text{A}$ See Fig. 1
		—	1.3	1.7		$I_F = 25\text{A}, T_J = 125^\circ\text{C}$
$I_{RM}$	Max Reverse Leakage Current	—	1.5	20	$\mu\text{A}$	$V_R = V_R$ Rated See Fig. 2
		—	600	2000		$T_J = 125^\circ\text{C}, V_R = 0.8 \times V_R$ Rated
$C_T$	Junction Capacitance	—	55	100	pF	$V_R = 200\text{V}$ See Fig. 3
$L_S$	Series Inductance	—	8.0	—	nH	Measured lead to lead 5mm from package body

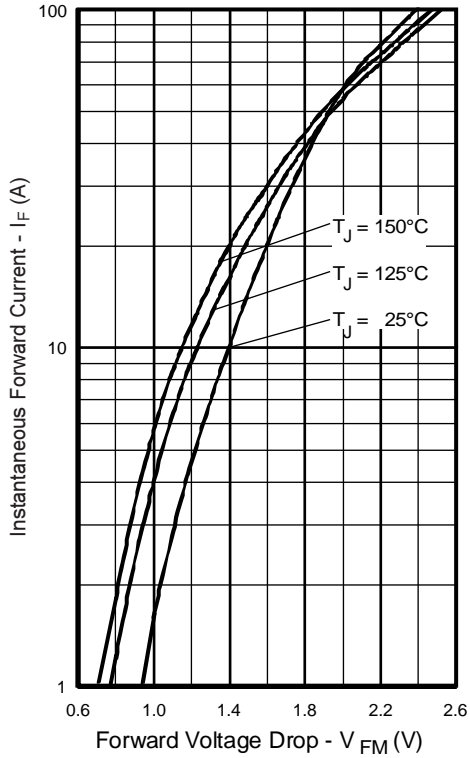
## Dynamic Recovery Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Test Conditions	
$t_{rr}$	Reverse Recovery Time	—	23	—	ns	$I_F = 1.0\text{A}, di/dt = 200\text{A}/\mu\text{s}, V_R = 30\text{V}$	
$t_{rr1}$	See Fig. 5, 6 & 16	—	50	75			$T_J = 25^\circ\text{C}$
$t_{rr2}$		—	105	160			$T_J = 125^\circ\text{C}$
$I_{RRM1}$	Peak Recovery Current	—	4.5	10	A	$T_J = 25^\circ\text{C}$	
$I_{RRM2}$	See Fig. 7 & 8	—	8.0	15			$T_J = 125^\circ\text{C}$
$Q_{rr1}$	Reverse Recovery Charge	—	112	375	nC	$T_J = 25^\circ\text{C}$	
$Q_{rr2}$	See Fig. 9 & 10	—	420	1200			$T_J = 125^\circ\text{C}$
$di_{(rec)M}/dt1$	Peak Rate of Fall of Recovery Current	—	250	—	A/ $\mu\text{s}$	$T_J = 25^\circ\text{C}$	
$di_{(rec)M}/dt2$	During $t_b$ See Fig. 11 & 12	—	160	—			$T_J = 125^\circ\text{C}$

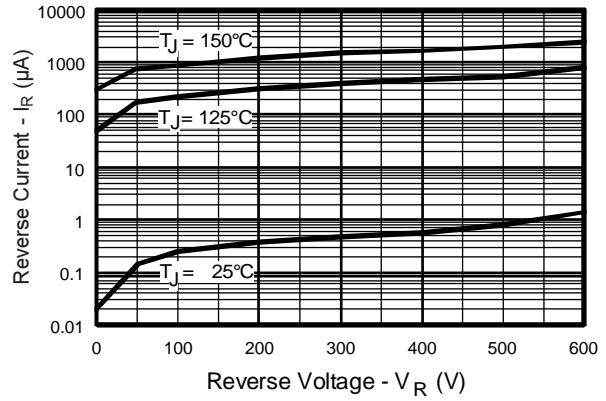
## Thermal - Mechanical Characteristics

	Parameter	Min.	Typ.	Max.	Units
$T_{lead} \textcircled{2}$	Lead Temperature	—	—	300	$^\circ\text{C}$
$R_{\theta JC}$	Thermal Resistance, Junction to Case	—	—	1.0	K/W
$R_{\theta JA} \textcircled{3}$	Thermal Resistance, Junction to Ambient	—	—	80	
$R_{\theta CS} \textcircled{4}$	Thermal Resistance, Case to Heat Sink	—	0.5	—	
$Wt$	Weight	—	2.0	—	g
		—	0.07	—	(oz)
	Mounting Torque	6.0	—	12	Kg-cm
		5.0	—	10	lbf-in

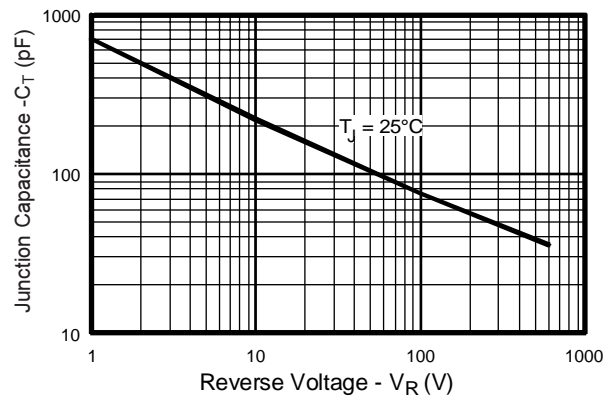
- ①  $L=100\mu\text{H}$ , duty cycle limited by max  $T_J$
- ② 0.063 in. from Case (1.6mm) for 10 sec
- ③ Typical Socket Mount
- ④ Mounting Surface, Flat, Smooth and Greased



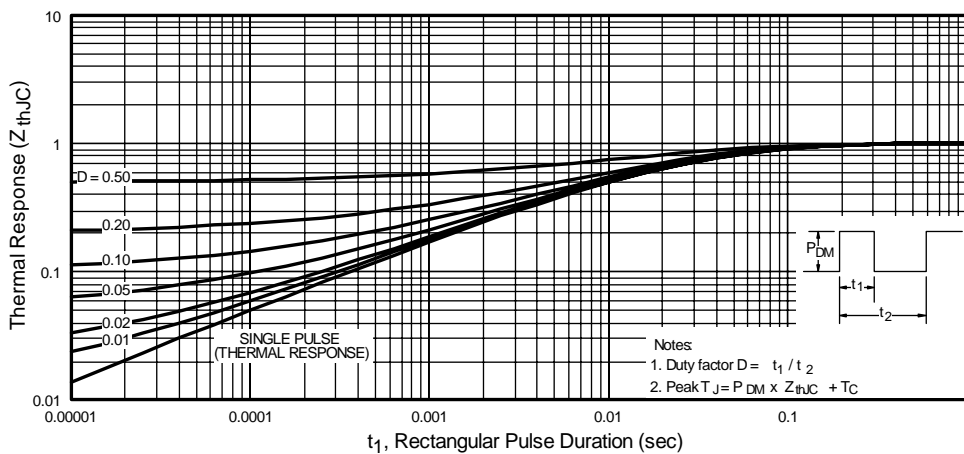
**Fig. 1** - Maximum Forward Voltage Drop vs. Instantaneous Forward Current



**Fig. 2** - Typical Reverse Current vs. Reverse Voltage



**Fig. 3** - Typical Junction Capacitance vs. Reverse Voltage



**Fig. 4** - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics

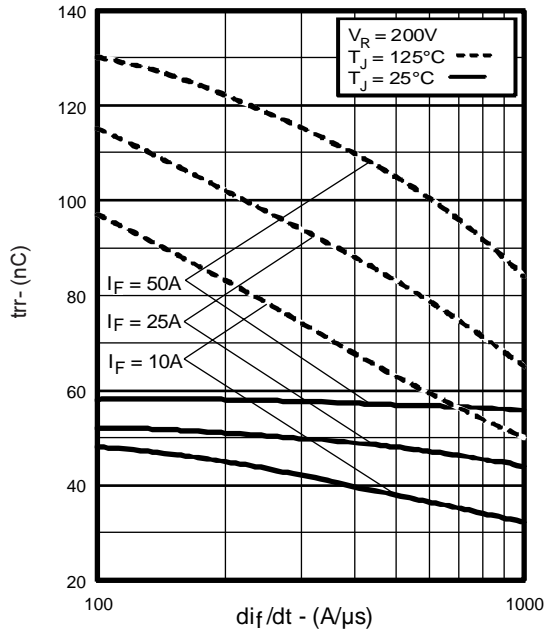


Fig. 5 - Typical Reverse Recovery vs.  $di_f/dt$

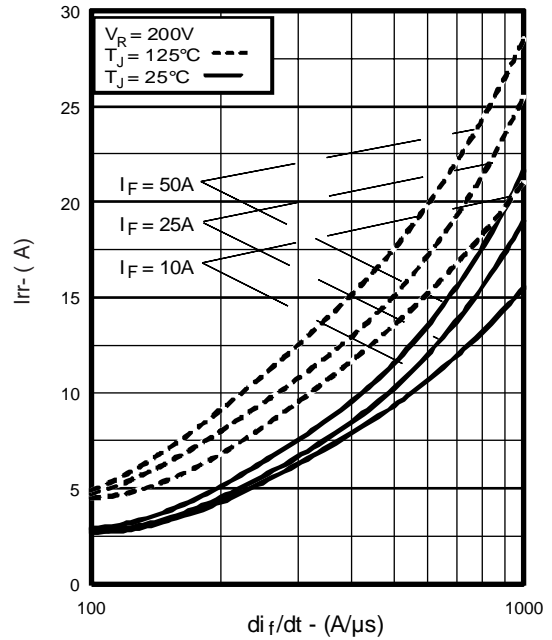


Fig. 6 - Typical Recovery Current vs.  $di_f/dt$

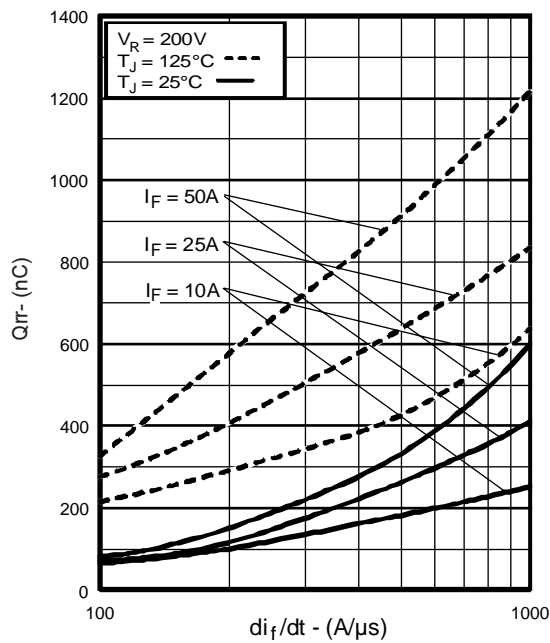


Fig. 7 - Typical Stored Charge vs.  $di_f/dt$

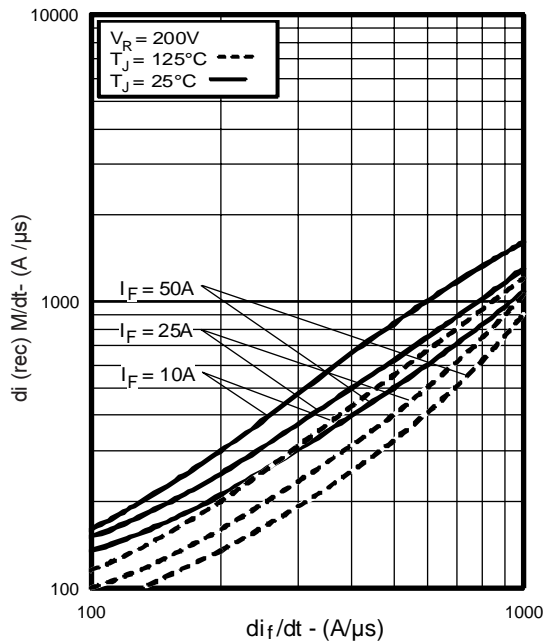
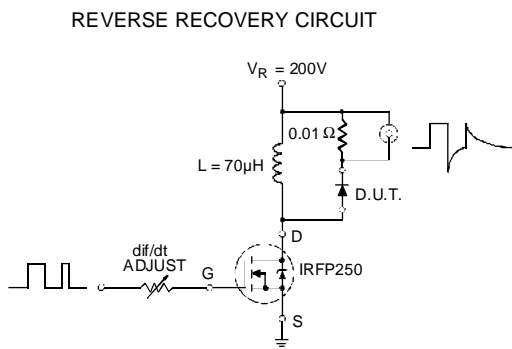
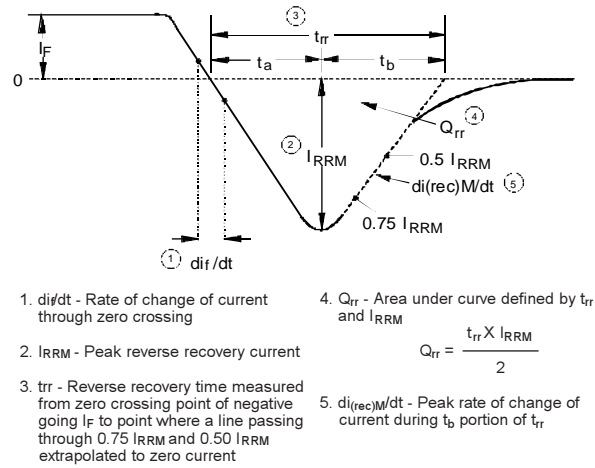


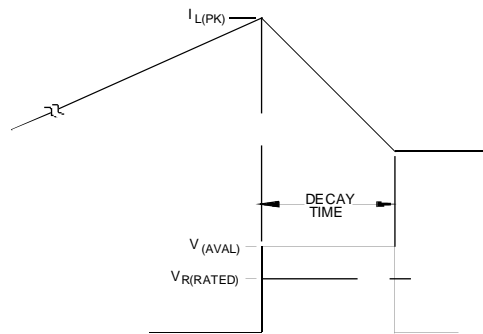
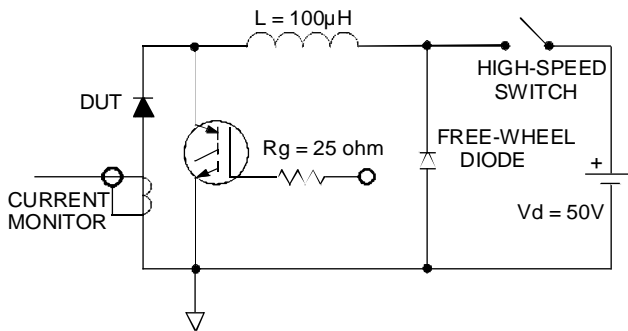
Fig. 8 - Typical  $di_{(rec)M}/dt$  vs.  $di_f/dt$



**Fig. 9 - Reverse Recovery Parameter Test Circuit**



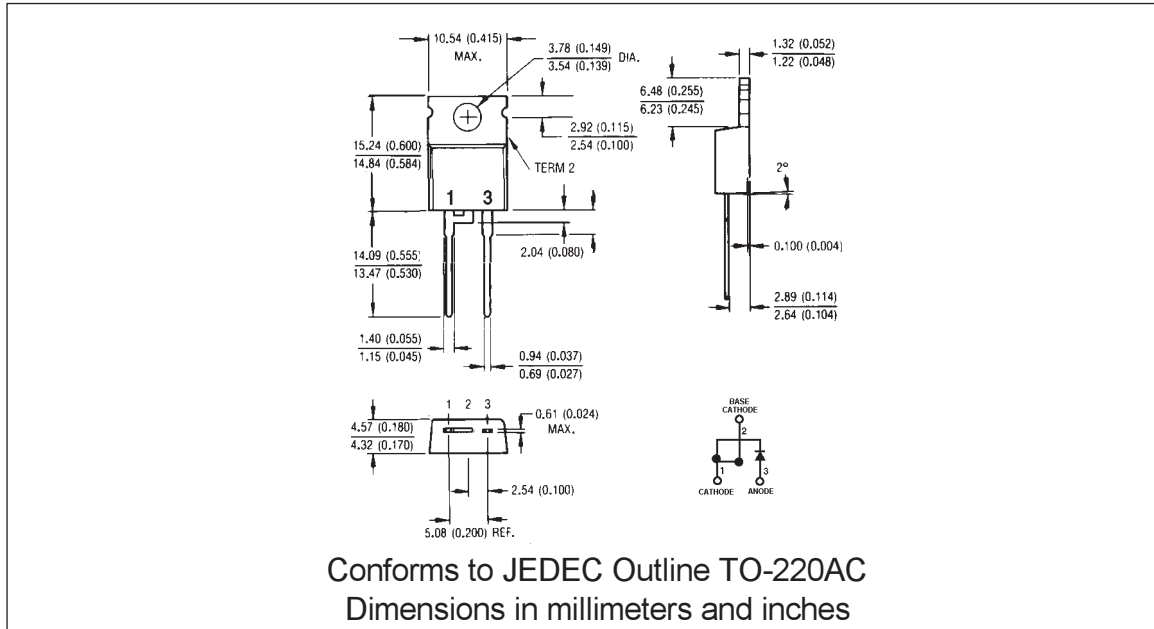
**Fig. 10 - Reverse Recovery Waveform and Definitions**



**Fig. 11 - Avalanche Test Circuit and Waveforms**

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Data and specifications subject to change without notice.

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